

REMARKS

Claims 1, 3-8, and 18-26 are pending in this application.

Claims 1, 3, and 5 have been amended to address informalities raised in the Office Action. Claim 18 finds support, for example, at page 6, lines 20-30. Claim 2 has been reintroduced as new claim 19, written in independent format. Claims 20-26 are identical to claims 3-8 and 19, but depend from claim 19. Approval and entry of the above claim amendments and new claims are respectfully requested.

Election/Restriction

Applicant hereby affirms the election of Group I, containing claims 1-8, 16, and 17, drawn to a method of producing a nanocomposite. Non-elected claims 9-15 have been canceled without prejudice to expedite prosecution. Applicant reserves its right to reintroduce the non-elected claims in this application or in a future continuation or divisional application.

Drawings

Applicant has submitted herewith replacement Figures 6 and 7 which address the objection raised in the Notice of Draftsperson's Patent Drawing Review. Applicant respectfully requests entry of the replacement sheets and withdrawal of the objection.

Specification

Applicant has amended the paragraph set forth at page 7, lines 2-7 of the specification to address the Examiner's specific concern regarding designation of the

percentages as weight percentages. Approval and entry of the amendment and withdrawal of the objection are respectfully requested.

Applicant has also amended the specification to reference the provisional patent application on which priority is based. A petition to accept an unintentional delay of the priority claim has been filed herewith. Other amendments to the specification have been presented to address typographical errors and the like. Approval and entry are respectfully requested.

Claim Objections

Applicant has amended claims 1-5, 7, 8, and 16 hereinabove to address the specific concerns of the Examiner. With regard to claim 2, Applicant respectfully submits that claim 1 provides proper antecedent basis for the phrase “the step of exfoliating.” The Examiner’s attention is directed to lines 2 and 4 of claim 1.

Applicant respectfully requests approval and entry of the above amendments and withdrawal of the objection to the claims.

Claim Rejections -- 35 U.S.C. § 102

Claims 1-8, 16, and 17 have been rejected under 35 U.S.C. § 102(a) as being anticipated by Lebovitz et al, “Innovative Process for Compatibilizing Polymer Blends and Producing Well-Exfoliated Polymer Nanocomposites: Solid-State Shear Pulverization,” PMSE Preprints, 88, pp. 96-97 (hereinafter “PMSE Preprints”).

Applicant respectfully traverses this rejection.

Pursuant to 37 C.F.R. § 1.78(a)(6), Applicant has filed herewith a petition to accept an unintentionally delayed claim under 35 U.S.C. § 119(e) for the benefit of a prior filed provisional application. Also filed is the surcharge under Rule 1.17(t). The entire delay between the date the claim was due under Rule 1.78(a)(5) and the date the claim was filed was unintentional.

The priority claim is to provisional application no. 60/423,591 filed November 5, 2002. The November 5, 2002 filing date of the provisional application predates the 2003 publication date of the PMSE Preprints. Accordingly, upon entry of Applicant's petition the PMSE Preprints article will no longer constitute prior art under Section 102(a). Further, even if the Patent Office were to deny Applicant's petition, the provisional patent application constitutes antedating evidence that would remove the PMSE Preprints article as prior art.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 102(a) rejection of claims 1-8, 16, and 17 over PMSE Preprints.

Claims 1, 7, and 16 have been rejected under 35 U.S.C. § 102(a) as being anticipated by Lebovitz et al., "Innovative Process for Compatibilizing Polymer Blends and Producing Well-Exfoliated Polymer Nanocomposites: Solid State Shear Pulverization," Abstracts of Papers, 225th ACS National Meeting, New Orleans, LA, March 27, 2003, American Chemical Society, PMSE-057 (hereinafter "ACS National Meeting Abstract").

As explained above, Applicant has petitioned for entry of a priority claim to a provisional application. The filing date of the provisional application predates the 2003 publication date of the ACS National Meeting Abstract. Accordingly, upon entry of

Applicant's petition the ACS National Meeting Abstract will no longer constitute prior art under Section 102(a). Further, even if the Patent Office were to deny Applicant's petition, the provisional patent application constitutes antedating evidence that would remove the ACS National Meeting Abstract as prior art.

For these reasons, Applicant respectfully requests reconsideration and withdrawal of the Section 102(a) rejection of claims 1, 7, and 17 over the ACS National Meeting Abstract.

Claims 16 and 17 have been rejected under 35 U.S.C. § 102(b) as being anticipated by EP 1 029 644 to Zwart. Claims 16 and 17 have been rejected under 35 U.S.C. § 102(b) as being anticipated by WO 02/11963 to Khait et al. Claims 16 and 17 have been rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 4,650,126 to Feder et al.

Applicant respectfully submits that the Section 102(b) rejections of claims 16 and 17 have been rendered moot by the cancellation of those claims. Accordingly, Applicant respectfully requests withdrawal of these rejections.

Claim Rejections -- 35 U.S.C. § 103

Claims 1, 6, and 7 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 4,650,126 to Feder et al. alone or in view of U.S. Patent No. 4,025,643 to Warner and *Hawley's Condensed Dictionary*.

Applicant respectfully traverses this rejection.

Claim 1 is directed to a method of producing a polymer-clay nanocomposite, featuring the steps of subjecting a polymer clay mixture to solid state shear pulverization

to exfoliate the clay of the mixture. The pulverization is conducted in the presence of sufficient cooling to maintain the mixture in the solid state during the pulverization.

Feder discloses a method for grinding soft and tacky polymers together in the presence of a grinding agent. Feder discloses that its grinding operation is conducted at a temperature that causes “the surfaces of polymer particles to melt, thus allowing the grinding aid to well adhere thereto and minimizing the amount of loose grinding aid to be disposed of.” (Column 2, lines 12-15) Melting of the particle surface is accomplished through recycling both polymer and air exhaust streams back to the mill to preheat the polymer particles. (Column 2, lines 5-11) In this respect, Feder’s express teaching of melting its polymer particles clearly contradicts the language of claim 1, which recites a step of exfoliating clay through solid-state shear pulverization in the presence of cooling sufficient to maintain the mixture in the solid state during the pulverization.

The specification of the present patent application provides inventive and comparative examples demonstrating that solid state pulverization enhances the degree to which the clay is exfoliated. Feder is silent as to this advantage. For these reasons alone, the Section 103(a) rejection of claim 1, and claims 6 and 7 which depend therefrom, should be withdrawn.

Additionally, Feder fails to disclose exfoliated clay, as recited in claim 1. Feder mentions the use of “clay” as a grinding aid, but neither identifies clay as preferred nor recognizes clay as possessing any special attributes over the other grinding aids, which include polymers having high melting temperatures, silica, calcium carbonate, zinc oxide, magnesium oxide, and other inorganics, with calcium carbonate being specified as the preferred grinding aid. (Column 2, lines 60-63; column 3, lines 2-7)

The Examiner opines that “given that clay is either layered or not, it would have been obvious to one of ordinary skill in the art to utilize layered clay that is exfoliatable.” (Office Action, page 7) Applicant respectfully disagrees. Motivation for combining or modifying references must be found in the prior art. Further, the prior art must be read as a whole in fashioning a Section 103(a) rejection. The ACS National Meeting Abstract, which was applied by the Examiner in support of the Section 102(a) rejection discussed above, states that it was known that there had been “long-standing problems” with melt-state processing of polymer blends and exfoliated particles for making nanocomposites. Applicant respectfully submits that a person having ordinary skill in the art would have been cognizant of this long-standing problem, and would have avoided the use of exfoliated clays in practicing Feder because of this knowledge.

Applicant further respectfully submits that contrary to the Examiner’s rejection, a person having ordinary skill in the art at the time the invention was made would not have been motivated to combine Feder with Warner and *Hawley’s Condensed Chemical Dictionary* to overcome Feder’s deficiency. Feder uses its grinding agents to prevent the reagglomeration of small polymer particles into larger aggregates and to avoid sticking of the polymer particles to the grinding equipment. (Column 1, lines 25-35) Feder selects generic, common polymers for its process, such as copolymers and terpolymers of acrylates, olefins, amides, esters, and the like.

While both Feder and Warner disclose grinding aids, any commonality between the patents and their technologies ends there. Applicant respectfully submits that the Examiner’s rejection is premised on the combination of patents taken from completely unrelated fields. Warner is directed to a rat repellent having as its primary ingredient

N,N-dialky-sulphenyl dithiocarbamate, a toxic pesticide. Warner has little or nothing to do with the processing of benign, common polymers such as disclosed in Feder. It is not evident from the prior art, and the Examiner has not explained, why a person of ordinary skill would have been motivated to look to the pesticide art to find teachings for polymer processing. Further, although both patents characterize their clays as grinding agents, the clays serve different purposes. As mention above, Feder uses its clay to avoid polymer agglomeration, whereas Warner selects a grinding agent to grind its crystals into a fine form that is water dispersible. Water dispersion and crystallization are not concerns expressed in Feder.

For these reasons, Applicant respectfully submits that the Section 103(a) rejection is misplaced, as respectfully requests reconsideration and withdrawal of the same.

Claims 1 and 3-5 have been rejected under 35 U.S.C. § 103(a) as being unpatentable over EP 1 029 644 to Zwart in view of Pinnavaia et al, *Polymer-Clay Nanocomposites*. Applicant respectfully traverses this rejection.

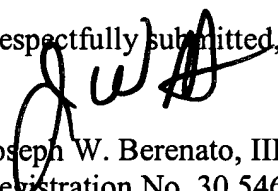
Zwart is directed to a method of preparing a colorant-coated polymeric resin powder for use in rotational molding. The polymeric resin and a volatile liquid color system are simultaneously fed into a grinding mill, and subject to grinding operations to form a colorant-coated polymeric resin. The grinding mill is operated at temperatures sufficient to cause the polymer particles to “very rapid[ly] heat up” and fully evaporate the volatile liquid color system from the surface of the powder particles. Virtually all of the non-colorant components of the volatile liquid color system are evaporated during a single pass of the material through the grinding mill.

Applicant respectfully submits that Zwart suffers from the same deficiency as noted above with regard to Feder, i.e., Zwart does not disclose or reasonably suggest a pulverization technique in which the polymer-clay mixture is in the presence of cooling sufficient to maintain the mixture in the solid state during the pulverization. The milling operation conditions employed by Zwart to evaporate volatiles of the liquid color system appear to be more extreme than those described in Feder, which did not have to concern itself with elevating temperature to evaporate volatiles. In view of Feder's disclosure that its process causes melting of the polymeric particle surfaces, it follows that the harsher operating conditions disclosed in Zwart for evaporating volatiles would similarly cause melting of the polymeric particle surfaces.

The specification of the present patent application provides inventive and comparative examples demonstrating that solid state pulverization enhances the degree to which the clay is exfoliated. Zwart is silent as to this advantage. Pinnavaia does not overcome the deficiencies of Zwart. For these reasons, the Section 103(a) rejection of claim 1, and claims 3-5 which depend therefrom, should be withdrawn.

If, after reviewing the above, the Examiner believes any issues remain unresolved, the favor of an Examiner interview is requested and the Examiner is requested to contact the undersigned, by telephone, to schedule the same.

Respectfully submitted,


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